UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/668,846	09/22/2000	Jacek Stachurski	TI-29491	2446

23494 7590 11/22/2004		EXAMINER
TEXAS INSTRUMENTS INCORPORATED		LERNER, MARTIN
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DALLAS, TX 75265	ART UNIT	PAPER NUMBER
	2654	

DATE MAILED: 11/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/668,846	STACHURSKI ET AL.
	Examiner	Art Unit
	Martin Lerner	2654

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>26 July 2004</u>.

2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1 to 6</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1,3,5 and 6</u> is/are rejected.

7) ☒ Claim(s) <u>2 and 4</u> is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on <u>26 July 2004</u> is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1.   Claims 5 and 6 are objected to because of the following informalities:

These claims do not end in a period.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for

all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described
> as set forth in section 102 of this title, if the differences between the subject matter sought to
> be patented and the prior art are such that the subject matter as a whole would have been
> obvious at the time the invention was made to a person having ordinary skill in the art to which
> said subject matter pertains. Patentability shall not be negatived by the manner in which the
> invention was made.

3.   Claims 1, 3, 5 and 6 are rejected under 35 U.S.C. 103(a) as being

unpatentable over *Gersho et al.* in view of *Iyengar et al.*

Regarding independent claim 1, *Gersho et al.* discloses a hybrid speech

encoder, comprising:

"a linear prediction, pitch, and voicing analyzer" – a speech signal 12

undergoes Linear Prediction (LP) analysis by LP module 14; for every frame, a

speech classifier/pitch/voicing (CPV) module 18 classifies the speech, and

generates pitch data 44 and voicing data 46 (column 13, lines 1 to 56: Figure

4A);

"a parametric encoder coupled to said analyzer" – voiced (harmonic)

coder 30 (column 13, lines 1 to 56: Figure 4A); a harmonic coder is a vocoder

based on a parametric description of the target input speech (column 4, lines 7 to

17);

"a waveform encoder coupled to said analyzer" – transition coder 32

(column 13, lines 1 to 56: Figure 4A); in the case of transition segments, an

analysis-by-synthesis waveform matching coder is used (column 14, lines 16 to

18: Figures 4A and 4D); many possible waveform coding models can be used for

transition signal coding (column 26, lines 16 to 37);

"wherein said parametric encoder encodes strongly-voiced frames and

said waveform encoder encodes both unvoiced and weakly-voiced frames

[including a pitch-prediction filter for weakly-voiced frames]" – harmonic coding

("parametric encoder") is used for steady state voiced speech ("strongly-voiced

frames") (column 10, lines 55 to 57; column 25, lines 14 to 43: Figure 4A); a

stationary unvoiced coder 28 encodes unvoiced speech; a noise-like coder is

used for encoding stationary unvoiced speech (column 11, lines 15 to 24: Figure

4A); a waveform encoder encodes stationary unvoiced speech ("unvoiced

frames") using random noise vectors for representing the excitation (column 14,

lines 38 to 40); transition coder 32 encodes transition segments ("weakly-voiced

frames") as an analysis-by-synthesis waveform matching coder (column 14, lines

16 to 27: Figures 4A and 4D); waveform coding methods can be used for

transition speech (column 26, lines 16 to 37).

The only element not clearly disclosed by *Gersho et al.* is "including a pitch-prediction filter for weakly-voiced frames." However, *Gersho et al.* discloses a weighted synthesis filter 66 for transition segments ("weakly-voiced frames") (column 14, lines 16 to 20: Figure 4D). Those skilled in the art would know that a pitch-prediction filter is a common element in speech encoders for introducing periodicity into the signal. *Iyengar et al.* teaches a wideband speech encoder with a pitch synthesis filter ("pitch prediction filter") to introduce an appropriate line spectrum component into a band. (Column 7, Line 43 to Column 8, Line 49) A pitch synthesis filter is the same as a pitch prediction filter. (Compare Specification, Page 18, Lines 1 to 4, defining the filter function for a pitch-prediction filter as $(1-gD^p)$ with the Equation at Column 7, Lines 60 to 61.) *Iyengar et al.* specifically notes that certain segments during the beginning of words that are preceded by silence yield an unstable pitch synthesis filter, but energy normalization can be carried out to scale the output of the pitch synthesis filter to circumvent the problem. (Column 8, Lines 36 to 49) Thus, *Iyengar et al.* suggests a pitch synthesis filter can still be used for transition segments to introduce an appropriate line spectrum component into the output signal. It would have been obvious to one having ordinary skill in the art to include a pitch-prediction filter for weakly-voiced frames in the hybrid encoder of *Gersho et al.* as suggested by *Iyengar et al.* for the purpose of introducing a periodic component into weakly-voiced frames.

Regarding independent claim 3, *Gersho et al.* discloses a hybrid speech decoder, comprising:

"a linear prediction synthesizer" – a conventional LP Synthesizer 118 produces reconstructed speech 20 using previous LP parameters from the encoder (column 14, lines 46 to 57: Figure 5);

"a parametric decoder coupled to said synthesizer" – Voiced (Harmonic) Decoder 112 (column 14, lines 46 to 57: Figure 5); a harmonic coder is a vocoder based on a parametric description of the target input speech (column 4, lines 7 to 17); thus, a harmonic decoder is a parametric decoder;

"a waveform decoder coupled to said synthesizer" – Transition Decoder 114 (column 14, lines 46 to 57: Figure 5); in the case of transition segments, an analysis-by-synthesis waveform matching coder is used (column 14, lines 16 to 18: Figures 4A and 4D); many possible waveform coding models can be used for transition signal coding (column 26, lines 16 to 37); thus, a transition decoder is a waveform decoder;

"wherein said parametric decoder decodes excitation for strongly-voiced frames and said waveform decoder decodes excitations for both unvoiced and weakly-voiced frames [including a pitch predictor for weakly-voiced frames]" – harmonic coding is used for steady state voiced speech (column 10, lines 55 to 57; column 25, lines 14 to 43: Figure 4A); a stationary unvoiced coder 28 encodes unvoiced speech; a noise-like coder is used for encoding stationary unvoiced speech (column 11, lines 15 to 24: Figure 4A); a waveform encoder encodes stationary unvoiced speech using random noise vectors for representing

the excitation (column 14, lines 38 to 40); transition coder 32 encodes transition

segments as an analysis-by-synthesis waveform matching coder (column 14,

lines 16 to 27: Figures 4A and 4D); waveform coding methods can be used for

transition speech (column 26, lines 16 to 37); thus, Voiced (Harmonic) Decoder

112 is a parametric decoder that correspondingly decodes steady state voiced

speech ("strongly-voiced frames"), Stationary Unvoiced Decoder 110 is a

waveform decoder that correspondingly decodes unvoiced frames, and

Transition Decoder 114 is a waveform decoder that correspondingly decodes

transition frames ("weakly-voiced frames").

The only element not clearly disclosed by *Gersho et al.* is "including a

pitch-prediction filter for weakly-voiced frames." However, *Gersho et al.*

discloses a weighted synthesis filter 66 for transition segments ("weakly-voiced

frames") in the encoder (column 14, lines 16 to 20: Figure 4D) Those skilled in

the art would know that a pitch-prediction filter is a common element in both

speech encoders and speech decoders for introducing periodicity into the signal.

Iyengar et al. teaches a wideband speech encoder with a pitch synthesis filter

("pitch prediction filter") to introduce an appropriate line spectrum component into

a band. (Column 7, Line 43 to Column 8, Line 49) A pitch synthesis filter is the

same as a pitch prediction filter. (Compare Specification, Page 18, Lines 1 to 4,

defining the filter function for a pitch-prediction filter as $(1-gD^p)$ with the Equation

at Column 7, Lines 60 to 61.) *Iyengar et al.* specifically notes that certain

segments during the beginning of words that are preceded by silence yield an

unstable pitch synthesis filter, but energy normalization can be carried out to

scale the output of the pitch synthesis filter to circumvent the problem. (Column 8, Lines 36 to 49) Thus, *Iyengar et al.* suggests a pitch synthesis filter can still be used for transition segments to introduce an appropriate line spectrum component into the output signal. It would have been obvious to one having ordinary skill in the art to include a pitch-prediction filter for weakly-voiced frames in the hybrid decoder of *Gersho et al.* as suggested by *Iyengar et al.* for the purpose of introducing a periodic component into weakly-voiced frames.

Concerning claims 5 and 6, *Gersho et al.* discloses a coder/decoder, implicitly implemented as a computer program of a microprocessor on a cellular telephone.

Allowable Subject Matter

4.   Claims 2 and 4 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

5.   Applicants' arguments filed 26 July 2004 have been fully considered but they are not persuasive.

Applicants argue that the transition frames of *Gersho et al.* apparently differ from Applicants' weakly-voiced frames. Also, Applicants say that the transition frame encoder of *Gersho et al.* explicitly avoids pitch prediction.

Applicants cite *Gersho et al.*, Column 26, Lines 20 to 37, for the statement that transition frames sometimes use pitch prediction as contrary to the weakly-voiced frames always using pitch prediction of the invention as claimed. This position is traversed.

Firstly, Applicants' argument that the transition frames of *Gersho et al.* "apparently differ" from Applicants' weakly-voiced frames is an unsupported statement. Those skilled in the art would know that transition frames are frames representing a transition between voiced and unvoiced frames. Thus, one skilled in the art would recognize that transition frames have voicing characteristics somewhere between voiced frames and unvoiced frames. A transition frame having voicing characteristics somewhere between voiced frames and unvoiced frames would then aptly be described as a weakly-voiced frame, as, heuristically, the voicing is not as strong as a voiced frame but stronger than that for an unvoiced frame. It follows that one skilled in the art would find the transition frames of *Gersho et al.* to be equivalent to the weakly-voiced frames of Applicants.

Secondly, although, admittedly, one skilled in the art would not expect a pitch-prediction filter to be as important for unvoiced or weakly-voiced (transition) frames as for strongly-voiced or voiced frames, it would still be recognized that there may be some advantages to employing a pitch-prediction filter to weakly-voiced frames. Generally, the purpose of a pitch-prediction filter is to emphasize or sharpen the pitch component in a synthesized speech signal so as to improve the perceptual quality. The degree of voicing is commensurate with the extent of

pitch component. Thus, emphasizing a pitch component would be particularly significant for voiced frames, as the pitch component is strong in voiced frames. However, as there is still some pitch component to weakly-voiced (transition) frames, those skilled in the art would appreciate that there could still be some benefit to emphasizing the pitch for weakly-voiced frames.

Admittedly, *Gersho et al.* says that pitch prediction is less important for transition segments (weakly-voiced frames) (column 26, lines 28 to 30), but that cannot be read to imply that there would never be an advantage to utilizing a pitch prediction filter in transition segments. Transition segments are known to have a weaker pitch component than voiced segments, but there is still a pitch component, albeit a less distinct one. Thus, one skilled in the art would appreciate that a pitch prediction filter could still be advantageous for transition segments. By way of noting the relative importance of pitch prediction for transition segments, *Gersho et al.* is mainly comparing the merits of multipulse codebooks versus adaptive codebooks as specific embodiments of waveform coders, a design choice that is not particularly relevant as to inclusion of a pitch prediction filter.

Thus, the rejection of claims 1, 3, 5 and 6 under 35 U.S.C. 103(a) as being unpatentable over *Gersho et al.* in view of *Iyengar et al.* is proper.

Conclusion

6.   **THIS ACTION IS MADE FINAL.** Applicants are reminded of the

extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire

THREE MONTHS from the mailing date of this action. In the event a first reply is

filed within TWO MONTHS of the mailing date of this final action and the advisory

action is not mailed until after the end of the THREE-MONTH shortened statutory

period, then the shortened statutory period will expire on the date the advisory

action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be

calculated from the mailing date of the advisory action. In no event, however, will

the statutory period for reply expire later than SIX MONTHS from the mailing
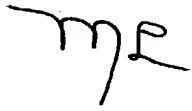
date of this final action.

Any inquiry concerning this communication or earlier communications from

the examiner should be directed to Martin Lerner whose telephone number is

(703) 308-9064. The examiner can normally be reached on 8:30 AM to 6:00 PM

Monday to Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the

examiner's supervisor, Richemond Dorvil can be reached on (703) 305-9645.

The fax phone number for the organization where this application or proceeding

is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from

the Patent Application Information Retrieval (PAIR) system. Status information

for published applications may be obtained from either Private PAIR or Public

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direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-

free).

RICHEMOND DORVIL
SUPERVISORY PATENT EXAMINER

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11/10/04